

Patent claims

1. Method for cultivation of cells at high densities and for obtaining of products from these cells characterized by the following steps:

-entering of the cells at high density into a cultivation chamber, wherein the cultivation chamber comprises several chambers and is semipermeably separated from the supply container;

-feeding of the cells through the supply container with a variably adjustable gas/cell cultivation medium mixture;

-obtaining the products and their discharge at the semipermeable walls of the chambers and based on a dissolution of the products in the variably adjustable gas/cell cultivation medium mixture.

2. Method according to claim 1 characterized in that plant cells and mammalian cells furnish the cells at high density.

3. Method according to claim , characterized in that the bringing in of the cells is performed through a central feeding system disposed outside of the supply container and wherein the cultivation chamber and the supply chamber are such connected to each other that the simultaneous entry of cells in all chambers is possible through a single connection.
4. Method according to one of claims 1 through 3 characterized in that membranes serve for the separation of cultivation chamber and supply container.
5. Method according to claim 4 characterized in that flat membranes or hollow fiber membranes are employed as membranes.
6. Method according to claim 4 characterized in that the membranes comprise a member of the group consisting of poly sulfone, polyethersulfone, polycarbonate, and mixtures thereof.
7. Method according to claim 1 characterized in that a member of the group consisting of a mist having a droplet size of from about 0 to 100

micrometers, a spraying having droplet sizes from about 100 to 5000 micrometers, a mixture out of fine gas bubbles in liquid, and mixtures thereof is employed as a gas/cell cultivation medium mixture.

8. Method according to claim 7 characterized in that the mist is generated by ultrasound with a high frequency; and that the spraying is generated by way of nozzles or spray heads.

9. Method according to one of the claims 1 through 8 characterized in that the products exiting at the membrane are collected in a vessel disposed below the chambers for the obtaining of cell products.

10. Method according to claim 1 characterized in that the gas/ cell culture media mixture enriched with product drops off the chambers by gravity and wherein the gas/ cell culture media mixture enriched with product is collected below the chambers.

11. Apparatus for cultivation of cells at high densities and for obtaining of products from these cells, comprising a cultivation chamber and a device for generating a variably adjustable gas/ cell culture media mixture,

wherein the cultivation chamber is furnished with several fixed chambers and wherein the several fixed chambers are semipermeably separated from a supply container, wherein the supply container contains a variably adjustable gas/cell cultivation medium mixture, wherein vessels for collecting the cell products are disposed below the chambers.

12. Apparatus according to claim 11 characterized in that each of the chambers does not surpass the length of 5 mm in one dimension.

13. Apparatus according to claim 11 characterized in that the cultivation chamber and the supply container are connected such to each other that the simultaneous entering of the cells into all chambers is possible through a single connector.

14. Apparatus according to one of the claims 13 through 14 characterized in that a hose or a Luer-connection serves as the connector.

15. Apparatus according to one of the claims 12 through 14 characterized in that the device comprises at least one mist generating chamber or an aerosol generating chamber.
16. Apparatus according to one of the claims 12 through 14 characterized in that the device comprises one or several nozzles or spray heads by way of which a rain can be generated.
17. Apparatus according to claim 11 characterized in that the apparatus additionally comprises a rotameter for measuring the volume streams of gas fed in, temperature measurement devices for checking a homogeneous temperature distribution, air filter for sterilization of feed in air and of exhaust air, pressure gauges, pressure measurement apparatus, mist deposit filter, and condensate catch container.
18. Apparatus according to claim 11 characterized in that the vessel for collecting the cell products is connected to a product reservoir, wherein the product reservoir is disposed outside of the supply container.

19. Use of the apparatus according to claims 11 through 18 for cultivating of cells at high densities and for obtaining of cell products, cell components, viruses or active agents.

20. Use according to claim 19 for obtaining medicine.

21. Use according to claim 29 for production of diagnostics.

22. A method for cultivation of cells at high densities and for obtaining of products from these cells comprising the following steps:

furnishing a supply container;

furnishing a cultivation chamber including several chambers and semipermeably separated from the supply container;

-entering of cells of high density into the cultivation chamber;

-feeding the cells of high density disposed in the cultivation chamber from the supply container with a variably adjustable gas/cell cultivation medium mixture;

generating products in the cultivation chamber with the cells of high density;

dissolving the products in the variably adjustable gas/cell cultivation medium mixture;
separating the products from the cells of high density at semipermeable walls; and
obtaining the products and discharging the products at the semipermeable walls of the cultivation chamber.

23. An apparatus for cultivation of cells at high densities and for obtaining of products from these cells, comprising
a device for generating a variably adjustable gas/ cell culture media mixture;
a supply container containing a variably adjustable gas/cell cultivation medium mixture;
a cultivation chamber is furnished with several fixed chambers, wherein the several fixed chambers are semipermeably separated from the supply container;
cells at high density disposed in the cultivation chamber for generating cell products;
vessels disposed below the cultivation chamber for collecting the cell products.